

A REVISION OF THE GENUS *PYROTA*. II. THE POSTICA GROUP (COLEOPTERA: MELOIDAE)

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Abstract.—The Postica Group of the genus *Pyrota* Dejean is defined to include the North American species *P. plagiata* (Haag-Rutenberg) and *P. postica* LeConte. The group differs from the closely related Mylabrina Group in having a bifasciate elytral color pattern and in structural characters of the antenna and male maxillary palpus. Seasonal activity, food plants, sexual behavior, and aggregating behavior of adults are considered. Predation of adults of *P. postica* by the asilid fly *Stenopogon abdominalis* (Say) is described. The distribution of *P. postica* in the southwestern United States and Mexico appears to be determined only partially by that of its favored food plant, *Larrea tridentata*; nearly complete allopatry of *P. plagiata* and *P. postica* suggests that interaction between the species may result in a narrowing of ecological tolerances in areas of contact. Complete synonymies are given for both species of the group and both are redescribed, with quantitative analyses of variation in coloration.

The Postica Group is proposed herein for the North American species *Pyrota plagiata* (Haag-Rutenberg) and *P. postica* LeConte. The group ranges from the southwestern United States to the southern end of the Central Plateau of Mexico (Fig. 1). In the adult stage it is immediately distinguished from the Mylabrina Group (Selander, 1982) in having a bifasciate, rather than trifasciate color pattern; indeed, on the basis of coloration alone, *P. plagiata* and *P. postica* are more likely to be confused with species of the Pacifica and Nobilis groups than with those of the Mylabrina Group (Selander, *in press*). Structurally, the Postica Group is distinguished from other groups of the genus by the great length of antennal segment I, the apex of which attains or surpasses the posterior margin of the eye in the male and the middle of the eye in the female. In addition, it differs from the Mylabrina Group in having the antenna more strongly tapered and the male maxillary palpus more elaborately modified. In particular, male maxillary palpal segment III is much larger and more elongated than in any of the species of the Mylabrina Group and segment II has a distinctive triangular shape. *Pyrota plagiata* differs from species of the Mylabrina Group, and at the same time resembles those of the Nobilis Group, in that the posterior marginal area of the sixth abdominal sternum is not curved dorsad. Behaviorally, the Postica Group is distinguished from the Mylabrina Group by the fact the male folds the antennae posteriad during the posterior antennation phase of courtship (Selander, 1964; unpublished data), as in *P. nigrovittata* (Haag-Rutenberg); in all species of the

Mylabrina Group that have been studied behaviorally, the antennae are folded to the sides or (*P. terrestris* Selander) directed anteriorly. Still, there is little question but that the Postica and Mylabrina groups are closely related, and it is more or less arbitrary as to whether they are to be treated as separate groups or as subgroups of a common group.

BIONOMICS

Adults of the group appear to be more nearly diurnal than those of many species of the Mylabrina Group. Only one specimen examined (a male of *P. postica*) is labeled as collected at light.

Seasonal activity.—Judged from collection records, the two species of the group have quite similar seasonal distributions of the adult stage. For *P. plagiata* the percentage distribution by month of records of adults is: June 9.7, July 58.1, August 32.2 ($N = 31$). For *P. postica* it is: May 8.2, June 24.5, July 38.8, August 22.4, September 6.1 ($N = 49$).

Food plants.—On several occasions I have found groups of adults of *Pyrota plagiata* feeding on the foliage of *Astragalus mollissimus* in pastures and rangeland in the Davis Mountains of Texas. A specimen from Kansas Settlement, Arizona, and two specimens from Cochise, Arizona, are labeled as taken on alfalfa [*Medicago sativa*]. Werner et al. (1966) reported a series of specimens from a "yellow-flowered composite" in the Chiricahua Mountains, and a specimen from Zacatecas was collected on *Solidago*. In addition, I once found an individual 15 mi. northwest of Durango, Durango, Mexico, feeding on the corolla of a species of *Sphaeralcea* (Malvaceae).

Larrea tridentata (creosote-bush, Zygophyllaceae) has been recorded (either as such or as *L. mexicana*) as the food plant of adults of *Pyrota postica* at five localities in Arizona, two in Texas, three in Durango, and one each in New Mexico and Chihuahua. Aggregations of "many hundreds" of adult beetles on *Larrea* were recorded by Hurd and Linsley (1975). In the course of observing an aggregation of adults on *Larrea* in Durango (see below) I found that feeding was confined to the flowers and that unopened flowers were preferred. In addition to the records of *P. postica* from *Larrea*, there are two from Leguminosae: one from *Melilotus alba* near Portal, Arizona (three adults), and one from mesquite (*Prosopis* sp.) at Laredo, Texas (Werner et al., 1966).

The geographic range of *Pyrota postica* is largely contained within that of creosote-bush. In Fig. 1 I have outlined the range of creosote-bush in North America, as given by García et al. (1961). From the figure it is evident that most of the localities from which *Pyrota postica* has been recorded fall within this range or are sufficiently close to it that they are probably within the actual range of the plant. In at least two regions, however, *P. postica* apparently occurs in its absence. One is in southern New Mexico, where the beetle has been taken in the Sierra Blanca and Sacramento mountains at elevations up to 8000 ft., well above the altitudinal range of *Larrea*. The other is the Texas Gulf Coast, where two localities (Hidalgo County and Kingsville) are well outside its known geographical range. At the same time, much of the range of *Larrea* in North America, including the Sonoran and Mojave deserts, is not inhabited by *P. postica*.

Sexual behavior.—*Pyrota postica* was one of several species treated in my study of sexual behavior in the genus *Pyrota* (Selander, 1964). Subsequent studies



Fig. 1. Geographic distribution of *Pyrota plagiata* (open circles) and *P. postica* (solid circles). Range of *Larrea tridentata* indicated by dotted line.

of the behavior of *P. plagiata*, to be described elsewhere (Selander, unpublished data), demonstrate that the species differ with respect to the number of abdominal strokes performed by the male in the posterior phase of courtship and in other details, although, as indicated above, they agree with respect to the positioning of the male's antennae.

Enemies.—Adults of *P. postica* are attacked by the asilid *Stenopogon (Ospriocerus) abdominalis* (Say), as described in the next section.

An aggregation of *Pyrota postica* adults.—An enormous aggregation of adults of *Pyrota postica* was observed by J. C. Schaffner and myself on 13 and 14 July 1959 at a site 19 miles north of the village of Cuencamé in eastern Durango, Mexico. The locality (Fig. 2) is in an arid, rocky valley between low mountains. The vegetation, which is typical of the northern part of the Central Plateau of Mexico, consists of a xerophytic shrub association, heavily dominated by creosote-bush, which was in flower when our observations were made. We observed the aggregation for two hours before dusk on 13 July and for two hours in the morning on 14 July.

The aggregation included several thousand individuals distributed irregularly over an area of about three acres. Some creosote-bushes held concentrations of 125–150 beetles each, most had only a few beetles, and a great many lacked them entirely. Early in the observations it became apparent that the aggregation was



Fig. 2. Habitat of *Pyrota postica* north of Cuencamé, Durango, Mexico.

drifting slowly northward, parallel to the highway and against a slight breeze. Movement of individuals was accomplished entirely by flight. Movement of the aggregation as a whole was effected by a general tendency for individuals to fly in a northerly direction, not by concerted flight of uniformly oriented individuals. Flights were usually short, taking the beetles only a few feet, from one bush to another. Occasional sustained flights were observed in which beetles left the aggregation; these were undertaken in a very deliberate manner and were almost invariably in a northerly direction.

Females were, for the most part, feeding on the flower buds and flowers of the creosote-bush. Many of the males were engaged in courtship. Often they would make short, hovering flights out from a bush and then back again or to a nearby bush, evidently in search of unattended females. When in flight both sexes appeared to be attracted by the sight of other beetles, and I surmised at the time that visual recognition and attraction played a large part in maintaining the cohesion of the aggregation. On several occasions we stood near a bush and observed the buildup of concentrations of beetles. As this occurred, beetles were continually flying in from nearby bushes, usually from the south. The concentrations were, however, only temporary, as the beetles soon began to disperse and to form new concentrations elsewhere. In the process of movement of the aggregation copulating pairs and occasional single individuals were left behind. It would be interesting to determine if copulating individuals later rejoin the aggregation.

On 13 July the sky was overcast, with the sun breaking through the clouds briefly at intervals. As dusk approached the frequency of flights, particularly sustained ones, increased.

On the morning of 14 July the sky was partly clear when we returned to the

site at 9:00 am. By this time the center of the aggregation had moved 100 yards to the north and the beetles had become both less numerous and less active than before. Evidently the beetles had been active for at least several hours during the night, since the rate of movement of the aggregation, as assessed the previous day, was too slow to account for a displacement of 100 yards in the hours since sunrise.

A conspicuous predator accompanying the aggregation was *Stenopogon abdominalis*, an asilid fly about one inch long, with a dark blue-black body and wings and an orange abdomen. The coloration suggests that of a wasp, and this effect is heightened by the fact that the flies, when not in flight, move in a halting manner and incessantly tap the folded wings against the abdomen. According to Linsley (1960), who gives a photograph of a pair of specimens, this fly is a mimic in the southwestern United States of the scoliid wasp *Scolia ardens* Smith.

The *Stenopogon* was easily the second-most conspicuous insect at the locality, numbering perhaps 50 individuals. Many were resting on stems of creosote-bush; others were on stones on the ground or patrolling the area in flight. We observed no actual captures of *Pyrota* adults, but several attacks were seen and four of the flies were found holding and feeding on adults. The attacks were made only when the beetles were moving very actively on the creosote-bush or were flying. We saw several instances of flies sitting within an inch of feeding beetles without paying the slightest attention to them. Conversely, the beetles seemed oblivious to the presence of the flies until they were actually attacked by them.

An attack is made by flying rapidly and directly to the prospective prey, grasping it with the legs, and attempting to insert the proboscis into its body. If the fly cannot insert the proboscis immediately, it abandons its intended victim, never pressing the attack. Attacked beetles thrashed the legs violently, and in all observed cases freed themselves rapidly. Flies that had captured beetles held them with the head oriented forward. In one case the fly had inserted the proboscis in the base of its prey's abdomen, between the elytra. In another the proboscis entered the dorsum of the cervical region. The bodies of captured beetles were extremely limp.

Almost precisely a year later I revisited the locality. Although the creosote-bush was again in flower, I found no adults of *P. postica* in several hours of searching and only one of *Stenopogon abdominalis*. When first observed, the fly was carrying an adult of an unidentified species of *Epicauta*, having inserted the proboscis into the cervical region.

Stenopogon abdominalis apparently specializes in the capture of meloid beetles. It has previously been reported (generally as *Ospriceris abdominalis*) preying on *Lytta biguttata* LeConte (Cockerell, 1905), *Tetraonyx fulva* LeConte (Linsley, 1960), at least five species of *Epicauta* (Linsley, 1960; Rogers and Lavigne, 1972; Pinto, 1980), and *Pyrota palpalis* Champion (Selander, 1982).

ADULT ANATOMY

The *Postica* Group is characterized anatomically in the adult stage as follows:

Elytral pattern bifasciate, consisting of a basal black fascia divided into an oval scutellar spot and a narrower humeral spot (rarely fused) and a large postmedian black fascia; latter fascia centered in apical $\frac{1}{3}$ of elytron, usually not extending basad of middle, $\frac{1}{3}$ to $\frac{2}{3}$ as long as the elytron (sometimes fusing with humeral spot), separated from both sutural and lateral margins. Clothing setae golden except on black areas of legs, where they are black.

Head moderately triangular; cuticle shiny, smooth, finely, very sparsely punctate, each puncture with a minute, erect seta. Antenna strongly tapered, distally very narrow; segments subfiliform, compressed. Eye broad. Pronotum about $\frac{4}{5}$ as wide as long, depressed on anterior $\frac{1}{2}$; cuticle as on vertex. Elytron almost as shiny as head and pronotum, feebly microgranulate, finely but distinctly, densely punctate, glabrous (lacking setal punctures) on disk; costulae well marked, complete. Venter shiny, smooth, clothed with moderately long setae, these moderately dense on thorax, sparse on abdomen. Outer hindtibial spur greatly thickened, expanded and obliquely truncate apically, 2–3 \times as wide as inner spur, which is sticklike. Tarsal pads well developed, dense, undivided on fore- and midleg. Pygidium entire.

Male.—Antenna more slender than in female; segment I greatly elongated, at least attaining posterior margin of eye, its length at least slightly greater than interocular distance (ID), strongly curved, broadened apically; III noticeably longer than IV, $\frac{1}{4}$ as wide as long, parallel-sided, more strongly compressed than following segments, strongly bowed posteriad, sinuate dorsoventrally; IV–X progressively shorter and narrower, none more than $\frac{1}{2}$ as wide as long; XI very narrow; flagellar segments lacking a ventral ridge and sensory depressions. Maxillary palpal segment III greatly enlarged, elongate-pyriform, with length at least equal to ID and with ventral membranous area covering all but apex; II transverse, produced laterad, its ventral surface densely punctulate and setate. Foretarsus symmetrically expanded; midtarsus not modified. Fifth (visible) abdominal sternum not depressed, entire; sixth broadly, rather shallowly, obtusely emarginate; membranous area curved dorsad or not, covering apical $\frac{2}{3}$ or less. Genitalia with gonostyli slender, parallel, not divergent distally, curving dorsad, each expanded laterad at apex; aedeagus with 2 ventral hooks of equal size; dorsal hook moderate in size, weakly curved, strongly, densely spinose.

Female.—Antennal segment I attaining at least middle of eye; III $\frac{3}{5}$ as long as I, $\frac{2}{5}$ as wide as long, not so strongly bowed as in male. Sixth abdominal sternum shallowly emarginate medianly.

KEY TO SPECIES BASED ON ADULTS

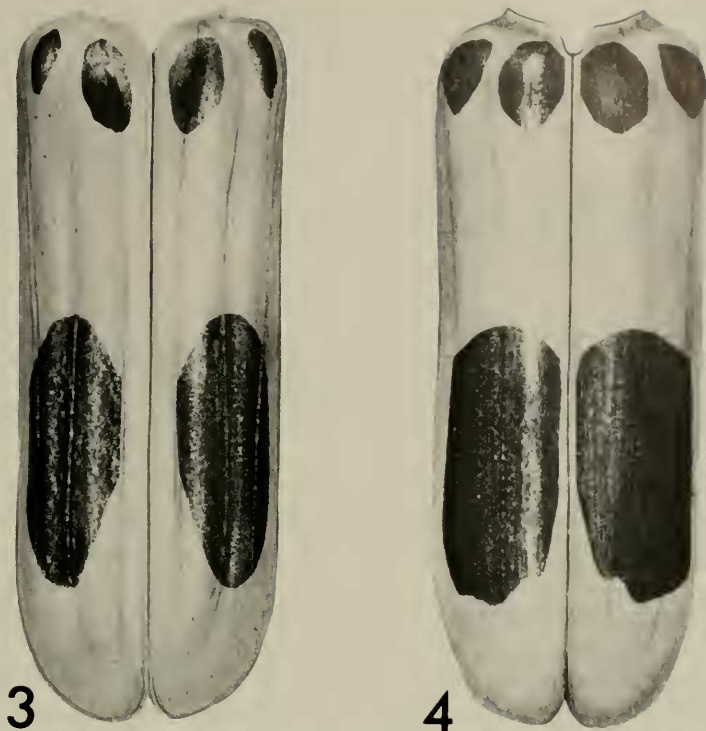
1. Antennal segment I attaining posterior margin of eye in δ , middle of eye in η ; postmedian black fascia of elytron oval, at most $\frac{2}{3}$ as wide as long; elytral costulae lying in depressions, the intervals between convex *plagiata* (Haag-Rutenberg)
- Antennal segment I surpassing posterior margin of eye in δ , attaining it in η ; postmedian black fascia subquadrate, usually at least $\frac{2}{3}$ as wide as long; elytral costulae not in depressions, the intervals between flat *postica* LeConte

Pyrota plagiata (Haag-Rutenberg)

Figs. 1, 3, 5–6, 8, 10, 12, 14

Cantharis maculata Lacordaire, 1859, pl. 60, fig. 4. [Type locality not given; type said to be in the Berlin Museum (Berg, 1881).]

Lytta plagiata Haag-Rutenberg, 1880: 49. [Type locality: Mexico; lectotype (here designated), female, in the Zoologische Staatssammlung in Munich, examined.]



Figs. 3, 4. Elytra. 3, *Pyrota plagiata*. 4, *P. postica*.

Cantharis lacordairei Berg, 1881: 303. [New name for *Cantharis maculata* Lacordaire, not *C. maculata* (Say, 1823–24: 298).]

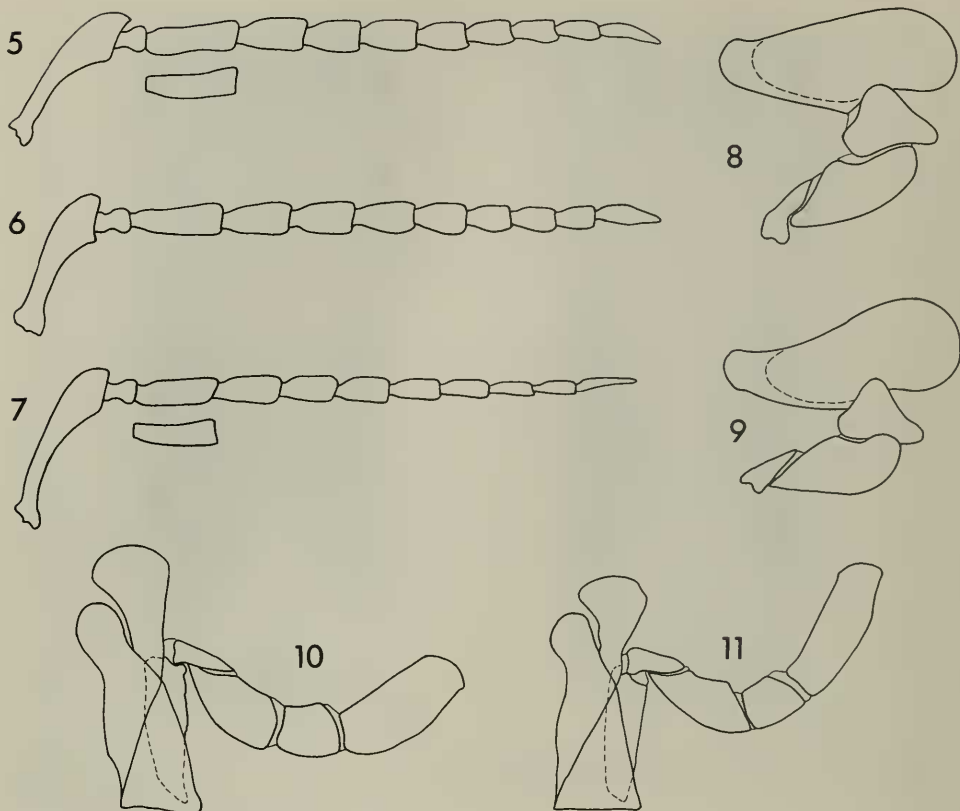
Lytta divirgata: Berg, 1883: 68 (in part).

Pyrota postica: Champion, 1891–93: 431 (in part: females, "Mexico"). Snow, 1907: 150. Denier, 1934: 64 (in part). Spieth, 1950: 20. Vaurie, 1950: 51.

Pyrota divirgata: Denier, 1934: 60 (in part).

Pyrota plagiata: Werner, 1954: 102–104, figs. 1–2. Werner, Enns, and Parker, 1966: 57.

Description of adult.—Orange; elytra distinctly paler than head and pronotum, varying from a lighter shade of orange to nearly pure yellow. Head sometimes with a black dash or pair of small spots on front between eyes, in heavily marked individuals occasionally with two or more small spots near frontoclypeal suture; occiput usually with a pair of lateral spots and a median spot, or with these spots broadly fused, in which case the black marking may encroach on the vertex; gula usually black. Antenna with segments III–XI black; I and II usually orange, varying to black in heavily marked individuals. Labrum orange to black. Maxillary palpal segment III black, usually with one or both of the preceding segments black also. Labial palpal segment III orange to black. Pronotum with a pair of spots on disk and a spot (usually smaller) on each side, one or both sets of spots very rarely absent. Elytron with scutellar spot frequently shorter than humeral spot, the two rarely fused; postmedian fascia elongate, oval, at most $\frac{2}{3}$ and usually less than $\frac{1}{2}$



Figs. 5-11. 5-7, Antennae. 5, *Pyrota plagiata*, male. 6, Same, female. 7, *P. postica*, male. 8, 9, Male maxillary palpi, dorsal views. 8, *P. plagiata*. 9, *P. postica*. 10, 11, Female maxillae, ventral views. 10, *P. plagiata*. 11, *P. postica*.

as wide as long, usually separated from sutural margin by about same distance as from lateral margin (always so if not extended basad of middle of elytron), highly variable in relative length; the shortest fascia observed is $\frac{1}{3}$ as long as the elytron, the longest more than $\frac{2}{3}$ as long as the elytron and fused with the humeral spot. Venter with black markings variable in extent; in lightly marked individuals, thorax largely black with sclerites broadly margined with orange and first 4-5 abdominal sterna black with a wide area on each side and along posterior margin orange; in the heavily marked extreme the entire venter black. Fore- and midcoxa with or without black basal markings, the forecoxa seldom with black on anterior surface; hindcoxa broadly black laterally. Femora and tibiae usually cleanly tipped with black at apex but varying to entirely black, in which case the coxae and trochanters are black or piceous. Length: 10-25 mm.

Head with ratio of distance between antennal sockets to width at tempora averaging .33 (SE = .03, $N = 10$); cuticle very sparsely if at all micropunctate. Eye width averaging .57 (SE = .07, $N = 10$) length, .87 (SE = .09, $N = 10$) ID. Labrum subquadrate, not strongly rounded laterally, feebly emarginate anteriorly, much more densely punctate laterally than medianly. Labium with segment III

Table 1. Ratio ($\times 100$) of length of postmedian fascia of right elytron to length of elytron in *Pyrota plagiata*.

Area	Mean, with 95% C.I.	N
Texas	43.0 \pm 8.3	4
Arizona, New Mexico	40.6 \pm 2.2	53
C. and S. Chihuahua	40.3 \pm 2.6	12
W. Chihuahua ¹	54.5 \pm 5.3	34
Durango, Zacatecas	55.0 \pm 10.8	3
Nayarit	53.9 \pm 2.5	17
Jalisco, Morelos	53.4 \pm 4.0	10
San Luis Potosí ¹	69.9 \pm 0.0	2

¹ Postmedian fascia fused with humeral spot in three specimens from W. Chihuahua and in both from San Luis Potosí. In these specimens the basal limit of the fascia was set arbitrarily as the point where the sides of the fascia would converge if extended without lateral deflection.

expanded, much wider than II. Pronotum with sides weakly divergent from base to anterior $\frac{1}{3}$. Elytron with costulae lying in longitudinal depressions, the intervals between costulae distinctly convex. Hindtarsal segment I with pale ventral setae limited to apex or (rarely) absent.

Male.—Antennal segment I with length slightly greater than ID, posterior apical margin just attaining posterior margin of eye, III $\frac{1}{2}$ to $\frac{2}{3}$ as long as I. Maxillary palpal segment III with length subequal to ID. Sixth abdominal sternum broadly, moderately deeply emarginate; membranous area weakly sloping, covering apical $\frac{2}{3}$, conspicuously setate, the median setae sparser and usually shorter than others. Genitalia with gonostylus weakly expanded at apex.

Female.—Antennal segment I with posterior apical margin attaining middle of eye. Maxillary palpal segment III rather heavy.

Geographic distribution.—San Luis Potosí and Morelos, Mexico, north along the western margin of the Central Plateau of Mexico to southeastern Arizona and southwestern New Mexico, with an apparently isolated population in the Davis Mountains of Texas. Apparently allopatric with *P. postica* except in southeastern Arizona (see discussion of that species). With the exception of Tepatate, San Luis Potosí, at an elevation of about 700 ft., the localities recorded for *P. plagiata* range from 4000 to 7100 ft., with most above 5000 ft. Specimens examined: 193.

Records.—MEXICO: *Chihuahua*: 8 mi. N Gallego; 2 mi. W Pedernales; San José Babícora; Santa Bárbara, Santa Bárbara District. *Durango*: 14 mi. NE Durango; 66 mi. S Hidalgo del Parral [in Chihuahua]. *Jalisco*: Guadalajara; 22 mi. NW La Piedad [in Michoacán]; 10 mi. NW Magdalena; Tequila and 1 mi. N. *Morelos*: Cuautla; Cuernavaca; Xochicalco. *Nayarit*: Jesús María; La Mesa de Nayar. *San Luis Potosí*: 18 mi. W San Luis Potosí; Tepatate. *Zacatecas*: 1.5 mi. W Fresnillo.

UNITED STATES: *Arizona*: Baboquivari Mountains; Chiricahua Mountains; Cochise; Douglas, Kansas Settlement, Cochise County; Palmerlee [=Garces]; mouth of Pinery Canyon, Chiricahua Mountains [Werner, Enns, and Parker, 1966]; 15 mi. W and 40 mi. S Portal; 12 mi. NW Willcox. *New Mexico*: Grant County; Silver City. *Texas*: Ft. Davis and 3 mi. S; Limpia Canyon, Davis Mountains; Marfa.

Discussion.—The color pattern varies greatly in this species, with a generally

Table 2. Variation in color pattern in *Pyrota plagiata*, expressed as percentage of specimens having specified characteristics.

Area	Black Marking(s) Present On				Occipital Spots Fused	Basal Elytral Spots ¹	Mean %	N
	Front of Head	Labrum	Ant. seg. I-II	Mesepisternum				
Texas	0.0	60.0	80.0	100.0	0.0	60.0	50.0	5
Arizona, New Mexico	0.0	8.9	14.3	57.1	0.0	57.1	22.9	56
C. and S. Chihuahua	0.0	8.3	25.0	50.0	0.0	66.7	24.8	12
W. Chihuahua	10.3	59.0	79.4	94.9	10.2	100.0	58.9	39
Durango, Zacatecas	33.3	66.7	66.7	66.7	66.7	100.0	66.7	3
Nayarit	47.6	85.7	38.1	38.1	57.1	100.0	61.1	21
Jalisco, Morelos	60.0	80.0	90.0	40.0	50.0	100.0	70.0	10
San Luis Potosí	100.0	100.0	100.0	100.0	100.0	100.0	100.0	2

¹ Spots on each elytron separated by a distance less than width of humeral spot.

high correlation between different parts of the body with respect to the strength of development of black markings. Analyses of variation in several characters of color pattern are presented in Tables 1 and 2.

Variation in the coloration of the abdomen can be described conveniently by use of the color classes defined in Fig. 16. All specimens of *P. plagiata* examined are assignable to class 5 except as follows: in the Arizona-New Mexico area, 1 specimen in class 3 and 2 in class 4; in the Durango-Zacatecas area, 1 specimen in class 6; in the San Luis Potosí area, both specimens in class 6. Through most of the range of the species the coloration of the legs is relatively stable. However, in the sample from western Chihuahua the mean extent of the apical black markings of the femora and tibiae is slightly greater than in samples from adjacent regions, while the two specimens from San Luis Potosí differ from all others in having the legs entirely black.

The available data indicate markedly weaker development of black markings in the population of the northern third of the range of the species (Arizona, New Mexico, Texas, and central and southern Chihuahua) than elsewhere. They are not adequate to demonstrate geographic trends within either of these two large segments of range, although the fact that both specimens from San Luis Potosí show maximal development of black coloration in every character analyzed seems significant.

As far as they go, the data are consistent with Gloger's ecological rule inasmuch as black coloration is least developed in the lowest, more arid portion of the range of the species, i.e., the northern half of the Chihuahuan Desert, at elevations largely between 4000 and 6000 ft. The sudden increase in strength of the black coloration in western Chihuahua is associated with a sharp increase in elevation and, consequently, humidity. The two localities from which the sample of the western Chihuahuan population were drawn, San José Babicora and Pedernales, at 7100 and about 7500 ft., respectively, are in the pine-oak zone of the eastern flanks of the Sierra Madre Occidental. Further south the humidity level remains relatively high even at lower elevations.

I have omitted from the analyses a small female collected at Kansas Settlement, Arizona, 28 July 1955, by G. F. Butler and F. G. Werner. It has the head nearly quadrate, elytra very smooth and shiny, elytral costulae hardly depressed, and

antennal segments I-II piceous. Individually these characteristics are within the observed range of variation in *P. plagiata*, but their combination in a single individual is unique.

Haag-Rutenberg described *P. plagiata* from at least two specimens. The syntype that I have designated as lectotype is labeled "Mexico, Bates" and carries Haag-Rutenberg's label "*plagiata* m[ihi]."

***Pyrota postica* LeConte**

Figs. 1, 4, 7, 9, 11, 13, 15

Lytta mylabrina [second form]: LeConte, 1858: 22.

Pyrota postica LeConte, 1863–66: 160. [Type locality: Texas; lectotype (here designated), female, in the Museum of Comparative Zoology, Harvard University, Type No. 5103, examined.] Horn, 1885: 113, pl. 5, fig. 15. Casey, 1891: 173. Champion, 1891–93: 431 (in part: males, Villa Lerdo, Durango, Mexico), pl. 20, fig. 5. Townsend, 1894: 101. Cockerell, 1898: 173. Snow, 1906: 174. Fall and Cockerell, 1907: 210. Denier, 1934: 64 (in part). Dillon, 1952: 357. Werner, 1954: 102–104, figs. 3–4. Selander, 1964: 1038 *et seq.*, tpls. I, IV–VIII, figs. 21, 26, 28–29. Selander and Mathieu, 1964: 714, tbl. 3. Werner, Enns, and Parker, 1966: 57. Hurd and Linsley, 1975: 108.

Description of adult.—Orange to yellow-orange; elytra only very rarely distinctly paler than head and pronotum. Antennal segments I–II consistently orange. Labrum very rarely black (2 specimens). Elytron with scutellar and humeral black spots very rarely fused (1 specimen); postmedian fascia subquadrate, with definite corners at least anteriorly, rarely more than $\frac{2}{5}$ as long as elytron, usually at least $\frac{2}{3}$ as wide as long, extending roughly to middle of elytron, separated from sutural margin by width of sutural swelling and from lateral margin by several times this distance. Venter, on the average, less extensively marked with black than in *P. plagiata*, never entirely black; at the lightly marked extreme, abdomen entirely orange and thorax largely so. Femora and tibiae always orange, cleanly tipped with black at apex. Length: 10–25 mm.

Elytron with costulae not lying in longitudinal depressions, the intervals between costulae flat. Hindtarsal segment I with pale ventral setae usually present from apex to apical $\frac{1}{3}$ or more, rarely limited to immediate apex.

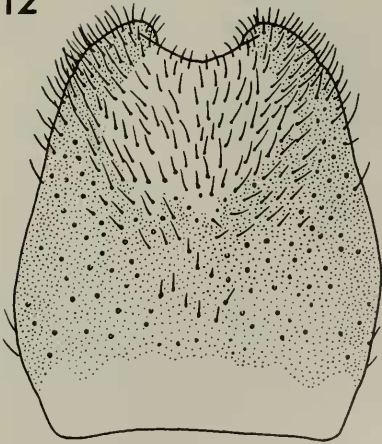
Male.—Antennal segment I longer than in *P. plagiata*, its mean length $\frac{1}{5}$ greater than ID, posterior apical margin clearly surpassing posterior margin of eye; III $\frac{1}{2}$ to $\frac{3}{5}$ as long as I. Maxillary palpal segment III larger, more strongly expanded laterad and more sinuate anteriorly; its width greater than ID. Sixth abdominal sternum more deeply, roundly emarginate; membranous area turned abruptly dorsad at about 45° angle. Genitalia with gonostylus more strongly and abruptly expanded at apex.

Female.—Antennal segment I with posterior apical margin just attaining posterior margin of eye. Maxillary palpal segment III more slender than in *P. plagiata*.

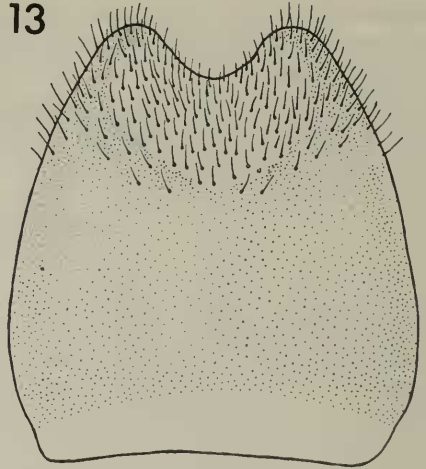
Geographic Distribution.—Southeastern Arizona, central New Mexico, and western and extreme southern Texas south on the Central Plateau of Mexico to eastern Durango and Nuevo León. Specimens examined: 460.

The distributional relationship of *P. postica* and its close relative *P. plagiata* suggests that these species may exert a limiting influence on each other's range. Reference to Fig. 1 shows that the range of *P. plagiata* is peripheral to that of *P.*

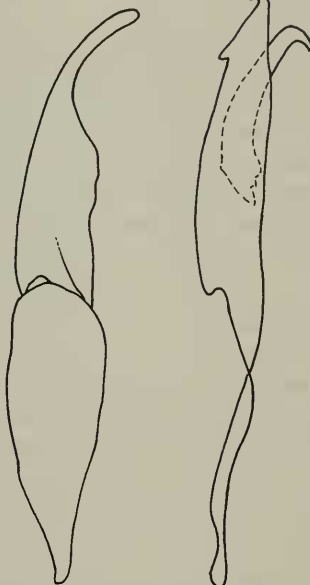
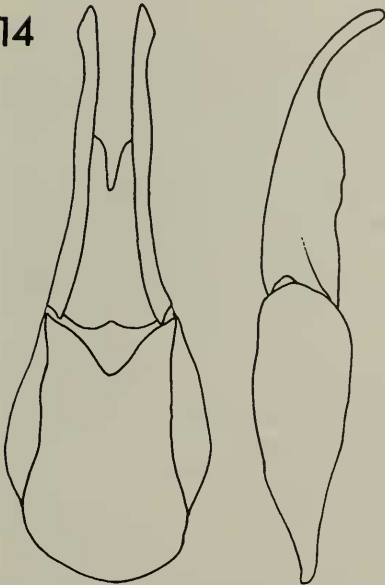
12



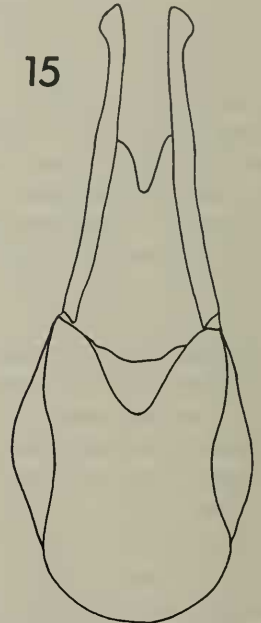
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14



15



Figs. 12-15. 12, 13, Male sixth abdominal sternite, ventral views. 12, *Pyrota plagiata*. 13, *P. postica*. 14, Male genitalia (ventral and lateral views of gonoforceps, lateral view of aedeagus) of *P. plagiata*. 15, Ventral view of male gonoforceps of *P. postica*.

postica. The distributional picture in southeastern Arizona is complicated, although even in that area there seems to be a high degree of allopatry. The only localities from which both species have been reported are Douglas and Willcox, Arizona. In general, it appears that *P. postica* occurs largely at elevations below 5000 ft. and *P. plagiata* largely at higher elevations. However, there are records of *P. postica* in the Sierra Blanca and Sacramento mountains of New Mexico between 5000 and 8000 ft.

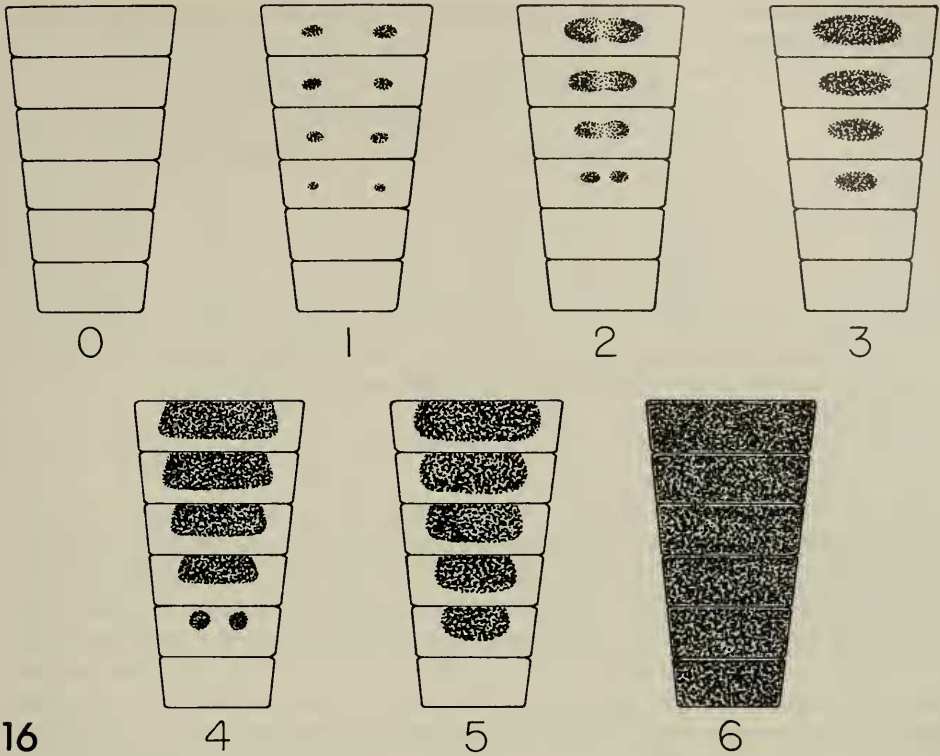


Fig. 16. Abdominal color classes.

As discussed in the section on bionomics, the preferred food plant of *P. postica* is *Larrea tridentata*. Since *P. plagiata* does not feed on this plant, the question arises as to why its range does not overlap that of *P. postica* more extensively. Conversely, although *P. postica* is capable of occurring outside the range of *Larrea*, it seems significant that it apparently does not do so in any area occupied by *P. plagiata*. Moreover, it is perhaps more than coincidental that *P. postica* occurs at elevations well within the altitudinal range of *P. plagiata* only in an area (southern New Mexico) where the latter species is absent. A possible explanation of these relationships is that natural selection resulting from interaction between the species in areas of contact limits the ecological tolerance of each so as to minimize or preclude sympatry. As to the nature of the interaction, current evolutionary theory recognizes two possibilities: production of inferior interspecific hybrids and competition. From their high degree of anatomical similarity as adults and the nature of their courtship behavior, I would guess that if they occurred together, the two species would carry on heterospecific courtship and at least occasional mating. In view of the abundance of *Larrea* over most of the range of *P. postica*, it would seem highly unlikely that this species ever competed seriously with *P. plagiata* for adult food. The possibility exists, of course, that there is or has been intense competition for larval food.

At present the range of *P. plagiata* is apparently disjunct, with at least the population in the Davis Mountains of Texas isolated from the main population of the species by an area of relatively low elevation representing the northern end

Table 3. Variation in color pattern in *Pyrota postica*, expressed as percentage of specimens having specified characteristics.

Area	Black Marking(s) Present On				Occipital Spots Fused	Basal Elytral Spots ¹	Mean %	N
	Front of Head	Labrum	Ant. seg. I-II	Mesepisternum				
Arizona, SW. New Mexico								
Mexico	1.9	1.9	0.0	0.0	22.6 ²	84.9	18.6	53
C. and SE. New Mexico	3.1	0.0	0.0	3.1	46.9	96.9	25.0	32
W. Texas	10.9	4.3	0.0 ³	0.0	21.7	82.6	19.9	46
Chihuahua	0.0	0.0	0.0	0.0	14.2	100.0	19.0	7
Durango	40.0	12.3	0.0	44.6	87.6	98.5	47.2	65
S. Texas, Coah., N.L.	68.8	18.8	0.0	37.5	87.5	100.0	52.1	16

¹ Spots on each elytron separated by a distance less than width of humeral spot.

² Spots absent in two specimens.

³ N = 45.

of the Central Plateau of Mexico, where the species is replaced by *P. postica*. Distributional relationships of this nature are commonly interpreted in terms of post-Pleistocene climatic changes. Under such a scenario, one would hypothesize that during the last Pleistocene glaciation *P. postica* was confined to the west, perhaps in the region of the Sonoran Desert, while *P. plagiata*, because of the more mesic conditions obtaining at the time, was able to occupy the northern part of the Plateau as a continuous population. Subsequently, as the climate became warmer and drier, *P. plagiata* moved to higher areas to the north and south as *P. postica* moved eastward, forming a wedge that ultimately bisected the range of the former species.

Records.—MEXICO: *Chihuahua*: Colonia Dublán; Colonia Juárez; 12 and 15 mi. S Villa Ahumada; Moctezuma. *Coahuila*: Saltillo. *Durango*: 19 mi. N and 7 mi. SW Cuernamé; Tlahualilo [de Zaragoza]; Villa [=Ciudad] Lerdo. *Nuevo León*: Monterrey.

UNITED STATES: *Arizona*: Bisbee; Bowie; Chiricahua Mountains; Douglas; Far Away River [not located]; Gila Valley; Pima County; Portal and vicinity; Ramsey Canyon, Huachuca Mountains; Safford [Werner, Enns, and Parker, 1966]; San Bernardino Ranch, 15 mi. E Douglas; San Carlos; San Simon; South Fork, Pinery Canyon, Chiricahua Mountains; Willcox. *New Mexico*: Anthony; Bent; Cloudcroft; Las Cruces; Lordsburg; Malpais Spring [mapped as Malpais]; Mes-calero; Mesilla Valley [Cockerell, 1898]; Peloncillo Mountains, 18 mi. N Rodeo; Rodeo and vicinity; Socorro. *Texas*: Alpine [Dillon, 1952]; Big Bend region; near Dagger Mountain, Big Bend National Park; 7 mi. NE Dell City; El Paso; El Paso County; Hidalgo County; Kingsville; Laredo; Nine Point Draw, Big Bend National Park; 10 mi. SE Pecos; Presidio; Rosillos Mountains, North Base; Sierra Blanca.

Discussion.—In both this species and *Pyrota plagiata* there is an allometric growth relationship between the width and length of the head, larger individuals of each species tending to have the head more strongly triangular in form than smaller ones.

The color pattern in *Pyrota postica* varies along much the same lines as in *Pyrota plagiata*. The postmedian black fascia of the elytron is comparatively stable

Table 4. Percentage distribution of specimens of *Pyrota postica* in abdominal color classes.

Area	Classes ¹						Mean	N
	0	1	2	3	4	5		
Arizona, SW. New Mexico								
Mexico	5.8	5.8	9.6	13.5	7.7	57.7	3.8	52
C. and SE. New Mexico			3.1	28.1	3.1	65.6	4.3	32
W. Texas		7.0	7.0	30.2	7.0	48.8	3.8	43
Chihuahua				42.9		57.1	4.1	7
Durango				4.2	2.1	93.8	4.9	192
S. Texas, Coah., N.L.						100.0	5.0	16

¹ Classes are defined graphically in Fig. 16.

in size and shape through the range of *P. postica*. Data on the variation of color pattern on several other parts of the body, comparable with those presented in Table 2 for *P. plagiata*, are given in Table 3. Comparison of these tables suggests that not only is *P. postica* less variable than *P. plagiata* but differs in having antennal segments I and II consistently pale in color and the mesepisternum much less frequently marked with black. Again, in conformity with Gloger's rule, the populations of *P. postica* in Durango and southern Texas, the least xeric part of the range of the species, are characterized by relatively strong development of black coloration.

The color of the legs does not vary appreciably. The color pattern of the abdomen, however, is even more variable than in *P. plagiata*. This variation is analyzed in Table 4 using the classes defined in Fig. 16. It is noted that class 6 (entirely black) apparently does not occur in *P. postica*, whereas (as indicated earlier) the lightly marked classes 0–2 are not known to occur in *P. plagiata*. Again, in this character, there is strongest development of black coloration in *P. postica* in the Durango and southern Texas populations. Moreover, the population in central and southeastern New Mexico evidently has, on the average, darker coloration than that in Arizona and southwestern New Mexico.

The most reliable and readily used character for distinguishing *P. postica* and *P. plagiata* is the relative length of antennal segment I. *Pyrota postica* is the only species of the genus in which the segment is so long that it obviously surpasses the eye in the male and attains the posterior margin in the female. In addition, the shape and position of the postmedian elytral fascia provide a basis for consistent interspecific discrimination, as do differences in the shape of maxillary palpal segment III in both sexes and in the form of the male genitalia. *Pyrota plagiata* can generally be recognized by the transverse undulation of the elytral surface, but in occasional specimens the surface is virtually as flat as in *P. postica*. The difference found by Werner (1954) between *P. plagiata* in Chihuahua and *P. postica* in Texas with respect to relative length of the postmedian fascia of the elytra has proved not to be diagnostic.

There has been much confusion regarding the identity of this species, most of which was clarified by Werner (1954). Dugès' (1889) record of *P. postica* from Ahualulco, Jalisco, seems to have been based on specimens of *P. rugulipennis* Champion, not *P. plagiata* as assumed by Werner (1954). The four females from

"Mexico" mentioned by Champion (1891-93) in his treatment of *P. postica* belong to *P. plagiata*, as do the specimens from Chihuahua recorded as *P. postica* by Spieth (1950) and Vaurie (1950).

Pyrota postica was described originally from two females. The specimen designated as lectotype, which is the first in LeConte's series, is labeled with a red disk indicating Texas.

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